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## PATENT SPECIFICATION

(11) 1284765

1284765

## DRAWINGS ATTACHED

- (21) Application No. 34547/69 (22) Filed 9 July 1969  
 (21) Application No. 3514/70 (22) Filed 23 Jan. 1970  
 (23) Complete Specification filed 22 June 1970  
 (45) Complete Specification published 9 August 1972  
 (51) International Classification A63B 31/10  
 (52) Index at acceptance A6D 44  
 (72) Inventor PHILIP-WILSON HAFENDEN



## (54) SWIM WEAR

(71) We, W. W. HAFENDEN LIMITED of Sandwich, Kent, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to swim wear and specifically to so-called swim-fins consisting basically of a shoe or glove part connected to a blade-like extension or fin. The invention is especially concerned with the first

along each side of the swim-fin.

Desirably, the reinforcing rib has an intermediate portion of relatively greater flexibility, associated with means for limiting the angle through which this portion can be flexed. These means may take the form of slots in the rib, the walls of which close together when the desired predetermined flexure has been attained. Alternatively, the longitudinally extending reinforcing rib may have substantially no resistance to flexure until a predetermined

## PATENTS ACT, 1949

## SPECIFICATION NO 1284765

By a direction given under Section 17 (1) of the Patents Act 1949 this application proceeded in the name of HAFENDEN-RICHBOROUGH LIMITED of Sandwich, Kent, a British Company.

R 13833/8

## THE PATENT OFFICE

a curved or angled position which imparts a forward thrust to the swimmer which, in the case of swim-fins intended to be worn on the feet, occurs when the fin is moved up and down in the water.

It happens that if a swimmer is not particularly strong he may not have sufficient power to bend the fin to shape to give good forward propulsion if the fin is stiff. Similarly, if the swimmer is strong and the fin is less stiff, it may become bent too much, so that again the forward thrust is not as it should be. It is an object of the present invention to remedy these difficulties.

The invention consists broadly in a swim-fin comprising at least one longitudinally extending reinforcing rib the latter having a resistance to flexure which increases abruptly at a predetermined curvature or angle of deflection. Preferably, two such longitudinally extending reinforcing ribs are provided, one

any be made of a comparatively soft or flexible material and it is desirable that the reinforcing rib should be of a different harder material. Where the fin portion is integral with or (whether integral or not) of the same material as the shoe portion, the reinforcing rib is preferably of a different relatively stiff material and may be secured in position along one or both sides of the swim-fin for example by being accommodated in a longitudinally extending housing therefor which should be moulded integrally with the body portion of the swim-fin. Where the fin portion is made separately of a stiffer material than the shoe portion, the reinforcing rib may be moulded integrally with the fin portion and may have a rearwardly extending portion for engagement by the shoe portion.

According to a further feature of the invention, the swim-fin is formed with a longitudinally extending projection, suitably of T-section, arranged to locate the respective end por-

[Price 25p]

SPECIFICATION AMENDED - SEE ATTACHED SLIP

## PATENT SPECIFICATION

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## DRAWINGS ATTACHED

- (21) Application No. 34347/69 (22) Filed 9 July 1969  
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 (52) Index at acceptance A6D 44  
 (72) Inventor PHILIP-WILSON HAFFENDEN



## (54) SWIM WEAR

(71) We, W. W. HAFFENDEN LIMITED of Sandwich, Kent, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to swim wear and specifically to so-called swim-fins consisting basically of a shoe or glove part connected to a blade-like extension or fin. The invention is especially concerned with the first mentioned type of swim-fin intended to be worn on the feet of the swimmer and the following description will for convenience refer to swim-fins of this type but it will be understood that the invention can also be applied to the glove type of a swim-fin. Accordingly, where reference is made hereinafter to shoe parts, this should be understood as importing in the alternative reference to glove parts.

Generally, the swim-fin as a whole is stiffened by being ribbed, especially by having longitudinally extending ribs, one along each side of the swim-fin. The shape of the ribs is generally designed so that the blade assumes a curved or angled position which imparts a forward thrust to the swimmer which, in the case of swim-fins intended to be worn on the feet, occurs when the fin is moved up and down in the water.

It happens that if a swimmer is not particularly strong he may not have sufficient power to bend the fin to shape to give good forward propulsion if the fin is stiff. Similarly, if the swimmer is strong and the fin is less stiff, it may become bent too much, so that again the forward thrust is not as it should be. It is an object of the present invention to remedy these difficulties.

The invention consists broadly in a swim-fin comprising at least one longitudinally extending reinforcing rib the latter having a resistance to flexure which increases abruptly at a predetermined curvature or angle of deflection. Preferably, two such longitudinally extending reinforcing ribs are provided, one

along each side of the swim-fin.

Desirably, the reinforcing rib has an intermediate portion of relatively greater flexibility, associated with means for limiting the angle through which this portion can be flexed. These means may take the form of slots in the rib, the walls of which close together when the desired predetermined flexure has been attained. Alternatively, the longitudinally extending reinforcing rib may have substantially no resistance to flexure until a predetermined curvature or angle of deflection of the swim-fin is reached, at which curvature or angle a substantial flexure resistance is introduced. Thus, in one arrangement, the longitudinal reinforcing rib is made as just described with transverse slots, with the difference that the slots extend right across the reinforcing rib. In another arrangement, the or each reinforcing rib is constructed with a hinge at a suitable position along its length where flexure is desired, the hinge incorporating stops which limit the bending in each direction to the desired angles.

The shoe portion of the swim-fin will generally be made of a comparatively soft or flexible material and it is desirable that the reinforcing rib should be of a different harder material. Where the fin portion is integral with or (whether integral or not) of the same material as the shoe portion, the reinforcing rib is preferably of a different relatively stiff material and may be secured in position along one or both sides of the swim-fin for example by being accommodated in a longitudinally extending housing therefor which should be moulded integrally with the body portion of the swim-fin. Where the fin portion is made separately of a stiffer material than the shoe portion, the reinforcing rib may be moulded integrally with the fin portion and may have a rearwardly extending portion for engagement by the shoe portion.

According to a further feature of the invention, the swim-fin is formed with a longitudinally extending projection, suitably of T-section, arranged to locate the respective end por-

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tion of a reinforcing rib by cooperation with a correspondingly formed slot moulded in the rib. At the blade end of the swim-fin, the aforesaid projection can be an integral marginal portion of the blade.

A particularly suitable material for the manufacture of the reinforcing rib is polypropylene.

The invention will be described further with reference to the drawings accompanying Provisional Specification No. 34547/69 ("the first Provisional") of which:

Figure 1 is a side view of a swim-fin in accordance with the invention,

Figure 2 is a scrap section on the line YY of Figure 1,

Figure 3 is a scrap section on the line XX of Figure 1,

Figure 4 is a side view showing a reinforcing rib of Figure 1 in a flexed position, and

Figure 5 is a scrap side view showing part of an alternative construction of a reinforcement part.

The swim-fin comprises a shoe portion A connected to a fin B (Figure 3) which is stiffened by longitudinal ribs C along each side of the swim-fin. In the present case this rib C is shaped to form a housing sheath for a stiffening rib D; an intermediate portion of the rib C is cut away to facilitate the insertion of rib D and to promote a relatively greater flexibility at the A region. The stiffening rib D is formed with slots or cut outs E so that it will bend easily until the slots have closed up on one side as illustrated in Figure 4, after which their flexible resistance increases sharply. This gives the advantage that both weak and strong swimmers will bend a fin to the correct extent and then in both cases the fin will strongly resist any further bending.

As already mentioned, a suitable material for the manufacture of the rib D is polypropylene which can be flexed without generating fatigue if the flexing is done slowly. In the illustrated embodiment the fin B is integral with the shoe part A but it is possible to have these two parts formed separately, in which case they can be of different material; the fin could be of a stiff material such as polypropylene in which case the rib D could be moulded integrally with it.

In the illustrated embodiment the reinforcing rib is sprung into a slotted pocket or sheath C which is shaped (by being cut away) to have a reasonably enhanced flexibility where the rib D itself is slotted to impart enhanced flexibility over a predetermined range of flexure. Other method of attachments could be adapted. For example the reinforcing rib D could be formed with a row of holes and the body of the swim-fin formed with a corresponding row of studs which can be forced through the holes.

It is preferred to have the reinforcing rib shaped or constructed so that it has an in-

termediate region of enhanced flexibility over a predetermined range of flexure. This can be achieved by the simple slots shown in Figure 1; an alternative form of slot is illustrated in Figure 5 where the bottom of the slot is enlarged in a longitudinal direction. This puts less strain on the flexible centre of the rib and the angling of the slot walls gives a bigger surface of contact when the rib is bent.

Further features of the invention will be described with reference to the drawings accompanying Provisional Specification No. 3514/70 ("the second Provisional") of which:

Figure 1 is a side view of a swim-fin in accordance with the invention, and

Figure 2 is a scrap section on the line II-II of Figure 1.

The swim-fin comprises a shoe portion A connected to a fin or blade B which is stiffened by a longitudinal reinforcing rib C along each side of the swim-fin. The rib C is formed at a position adjacent the conjunction of the parts A and B with a hinge D comprising a hinge pin E integral with the "A" end of the rib, the correspondingly apertured inner end portion of the "B" section of the rib being formed with an arcuate cut away F into which there projects a stop portion G integral with the pin E. It will be apparent that co-operation between the stop portion G and the cut away F limits the angle through which the hinge D can turn.

As it will be seen from Figure 2, the shoe portion A is formed with a longitudinal projection H of T-section and the respective portion of the rib C is formed with a slot of corresponding dimensions whereby the shoe portion of the rib C is located in position. There is a corresponding formation on the other side of the shoe portion A. The fin or blade portion of the rib C is likewise slotted at I and is held in position by the edge portion J of the fin B.

It is a useful feature of the present invention that not only can the degree of flexing be controlled so that it is minimally dependent upon the strength of the swimmer; it can be controlled in opposite directions. Thus, where the rib is slotted from both sides as illustrated in Figures 1, 4 and 5 of the first Provisional the construction could be modified by making the slots on one side shallower and/or narrower. This can be of value since it can be advantageous for the fin (using the flexing of the ankle) not to bend forwards but only to be allowed to bend downwards to give propulsion when the leg is being moved forwards.

#### WHAT WE CLAIM IS:—

1. A swim-fin comprising at least one longitudinally-extending reinforcing rib the latter having a resistance to flexure which increases abruptly at a predetermined curvature or angle of deflection.

2. A swim-fin according to claim 1 in which two of said longitudinally-extending reinforcing

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ing ribs are provided, one along each side of the swim-fin.

3. A swim-fin according to claim 1 or 2 in which the or each said rib has an intermediate portion of relatively greater flexibility, associated with means for limiting the angle through which this portion can be flexed.

4. A swim-fin according to claim 3 in which said means take the form of slots in the reinforcing rib, the walls of which close together when the desired predetermined flexure has been attained.

5. A swim-fin according to claim 3 or 4, modified in that said intermediate portion has substantially no resistance to flexure until a predetermined curvature or angle of deflection of the swim-fin is reached, at which curvature or angle a substantial flexure resistance is introduced.

6. A swim-fin according to claim 5, in which the longitudinal reinforcing rib is formed with transverse slots the walls of which close together when the desired predetermined flexure has been attained, the slots extending right across the reinforcing rib, interrupting the same.

7. A swim-fin according to claim 5 in which the or each reinforcing rib is constructed with a hinge at a suitable position along its length where flexure is desired, the hinge incorporating stops which limit the bending in each direction to the desired angles.

8. A swim-fin according to any preceding claim, in which the body portion is of a comparatively soft or flexible material and the reinforcing rib is of a different, harder material.

9. A swim-fin according to claim 8 in which the body portion (shoe or glove portion) of the swim-fin is made separately from the fin portion, and the reinforcing rib is integral with the fin portion.

10. A swim-fin according to any of claims 1 to 8 in which the body portion and fin portions are integral and in which the reinforcing rib is separately moulded and secured by a housing portion or portions moulded integrally with the aforesaid body and fin portions.

11. A swim-fin according to any of the foregoing claims formed with a longitudinally extending projection, suitably of T-section, arranged to locate the respective end portion of said reinforcing rib, by cooperation with a correspondingly formed slot moulded in the rib.

12. A swim-fin according to claim 11 in which the fin or blade portion has said T-section form along its lateral margin.

13. A swim-fin according to any of the foregoing claims in which the reinforcing rib is made of polypropylene.

14. A swim-fin substantially as hereinbefore described with reference to the drawings accompanying the first Provisional.

15. A swim-fin substantially as hereinbefore described with reference to and as shown in the drawings accompanying the second Provisional.

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PROVISIONAL SPECIFICATION

1 SHEET

*This drawing is a reproduction of  
the Original on a reduced scale*